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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,190	06/27/2003	Tajul Arosh Baroky	70030981-1	7614

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EXAMINER	
ROY, SIKHA	

ART UNIT	PAPER NUMBER
2879	

NOTIFICATION DATE	DELIVERY MODE
11/15/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/609,190	BAROKY ET AL.	
	Examiner	Art Unit	
	Sikha Roy	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6-11,13-23,25,32,33 and 35-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *32* is/are allowed.

6)☒ Claim(s) *1,2,4,6-11,13-23,25,33 and 35-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/12/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The Response, filed on 9/4/07, has been entered and acknowledged by the Examiner.

The indicated allowability of claims 1, 2, 4, 6-11,13-23 and 32 is withdrawn in view of the newly discovered reference(s). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,2,4,6-11,14 -16,18-23, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,252,254 to Soules et al. and further in view of U.S. Patent 6,809,471 to Setlur et al. and U.S. Patent Application Publication 20040212295 to Yin Chua et al.

Regarding claim 1 Soules discloses (column 2 lines 1-32) a light emitting device comprising a laser diode and a phosphor composition positioned to receive light (blue light) from the laser diode and capable of absorbing the light and emitting light at a wavelength longer than that (blue) emitted from the laser diode. Soules further discloses (column 4 lines 10-24) the phosphor composition comprising first type of phosphor

particles emitting red light and second type of phosphor particles emitting green light upon excitation from the blue-emitting LED.

Soules does not exemplify the phosphor particles in the phosphor composition selected to have d_{90} size in the range of 30 micrometers to 45 micrometers , d_{90} referring to a selected size where 90 volume percent of particles are smaller than the selected size.

Yin Chua in same field of endeavor discloses (para [0010]) a phosphor composition having phosphor particles of different sizes mixed where d_{90} is less than or equal to 35 micrometer included in diodes and laser diodes. It would be obvious to one of ordinary skill in the art to have the selected size of the phosphor particles of Soules such that d_{90} less than or equal to 35 micrometer as suggested by Yin Chua since use of known technique to improve similar device in the same way would yield predictable result.

Regarding claim 1 Soules and Yin Chua do not exemplify first type of phosphor emitting red light comprising a material selected from $Mg_4GeO_{5.5}F: Mn^{4+}$ and $ZnS: Mn^{2+}$.

Setlur in pertinent art discloses (column 7 lines 24-28) suitable phosphor materials emitting in red region (peak emission in the range from 610 nm to about 700nm) in an LED emitting near uv-to-blue light for providing white light is $Mg_4GeO_{5.5}F: Mn^{4+}$ (the examiner notes that $3.5\ MgO.0.5MgF_2.GeO_2: Mn^{4+}$ is the same red phosphor $Mg_4GeO_{5.5}F: Mn^{4+}$). It is noted that the luminous intensity in the red range and the resultant optical efficiency achieved by means of this phosphor is very high (as evidenced by U.S. Patent 6,654,079 to Bechtel et al.).

Therefore it would have been obvious to use $Mg_4GeO_{5.5}F$: Mn^{4+} for red emitting phosphor as suggested by Setlur in the phosphor composition of Soules and Yin Chua for providing high optical efficiency.

Regarding claim 2 Soules (column 2 lines 26,27) the light emitting device (phosphor composition and the light source together) producing white light.

Referring to claim 4 Soules discloses the first type (red color emitting phosphor) emits light having wavelength in the range of 600-630 nm.

Regarding claim 6 Soules discloses the second type of phosphors (column 4 lines 11-13) emits green light having wavelength in the range of 510-560 nm.

Regarding claim 7 Soules discloses the second type of phosphor particles comprising $Sr(Ga)_2S_4$: Eu^{2+}.

Regarding claim 8 Soules discloses the first type (red color emitting phosphor) emits light having wavelength in the range of 600-630 nm.

Regarding claim 9 Soules discloses phosphor composition emitting yellow light.

Regarding claims 10 and 11 Soules discloses (column 5 lines 53-65) the yellow phosphor emitting light in the wavelength range of 570-590 nm and comprising $Y_3Al_5O_{12}$: Ce^{3+}.

Regarding claim 14 Soules discloses (Fig. 2 col. 6 lines 15-29) the phosphor composition 15 is disposed on a surface of a lens 16 positioned to receive light from the laser diode.

Regarding claim 15 Soules discloses (column 6 lines 15-27 Fig. 2) phosphor composition comprising clear polymer (such as polycarbonate) having phosphor particles suspended therein and the clear polymer matrix 15 is shaped as a lens, positioned to receive light from the laser diode and to direct light from the light emitting device.

Regarding claim 16 Soules discloses (column 5 lines 61-65) the phosphor composition comprising $SrS:Eu^{2+}$.

Regarding claim 18 Soules and Setlur disclose the phosphor composition comprising $Mg_4GeO_{5.5}F: Mn^{4+}$.

Claim 19 essentially recites the same limitations as of claim 7 and hence is rejected for the same reason.

Regarding claim 20 Soules discloses (column 2 lines 1-9) the light emitting device comprising phosphor composition with $Y_3Al_5O_{12}: Ce^{3+}$.

Regarding claim 21 Soules discloses (column 5 lines 56,57) the phosphor composition (red color-emitting phosphor) has an emission peak in the wavelength range of 600-650nm.

Regarding claim 22 Soules discloses the phosphor composition (green color-emitting phosphor) has an emission peak in the wavelength range of 530-555nm.

Regarding claim 23 Soules discloses (column 5 lines 52-56) the phosphor composition has an emission peak in the wavelength range of 570-590nm.

Referring to claim 25 Soules discloses (column 2 lines 112, claim 2) the light emitting device is a blue emitting laser diode.

Claim 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,252,254 to Soules, U.S. Patent Application Publication 20040212295 to Yin Chua et al. and U.S. Patent 6,809,471 to Setlur et al. and further in view U.S. Patent 6,576,488 to Collins et al.

Regarding claim 13 Soules, Yin Chua and Setlur do not exemplify the phosphor composition between 100 to 150 micrometer being a conformal coating on the surface of the laser diode.

Collins in pertinent art of light emitting semiconductor structure discloses (Fig.8A column 8 lines 20-35) conformal phosphor layer 12 formed on the LED chip 10. Collins further discloses (column 3 lines 1-3) this conformal coating of phosphor (with uniform thickness) produces uniform white light. Collins discloses (column 8 lines 34,35) the thickness of phosphor coating is about 15 μm to 100 μm.

Therefore it would have been obvious to one of ordinary skill in the art the time of invention to modify the phosphor composition of Soules, Yin Chua and Setlur by conformal coating, between 15 and 100 micrometer as taught by Collins to produce uniform white light.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,252,254 to Soules, U.S. Patent Application Publication 20040212295 to Yin Chua et al. and U.S. Patent 6,809,471 to Setlur et al. and further in view of U.S. Patent 6,586,882 to Harbers .

Regarding claim 17 Setlur, Yin Chua and Soules do not disclose the phosphor composition comprising a material selected from CaS:Eu^{2+}, Mn^{2+} and (Zn, Cd)S: Ag^{+}.

Harbers in same field of endeavor discloses suitable phosphor material for converting blue light to red light is CaS: Eu^{2+}, Mn^{2+}. Harbers further teaches that these materials have are relatively high quantum efficiency and light absorption and have a relatively very high lumen equivalent upon converting light from first wavelength range to light of second wavelength range.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include CaS: Eu^{2+}, Mn^{2+} in the phosphor composition of Soules and Setlur as suggested by Harbers for providing high luminous intensity and optical efficiency of the light emitting device.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,252,254 to Soules, and further in view of U.S. Patent 6,791,150 to Takagi.

Regarding claim 33 Soules discloses (column 2 lines 1-32) a light emitting device comprising a laser diode and a phosphor composition positioned to receive light (blue light) from the laser diode and capable of absorbing the light and emitting light at a wavelength longer than that (blue) emitted from the laser diode.

Soules is silent about the light emitting device comprising a driver circuit operating the laser diode in a pulse or continuous wave mode.

Takagi in same field of endeavor discloses (Fig2A column 9 lines 1-35) a driver circuit 50 which provides current I_m in a pulse mode and thus operates a laser diode 11, converting an electric signal to optical signal.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include a drive circuit providing current in pulse mode for operating the laser diode of Soules as taught by Takagi for converting electric signal to optical signal for a display.

Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,252,254 to Soules, U.S. Patent 6,791,150 to Takagi and further in view of U.S. Patent 6,504,301 to Lowery.

Regarding claim 35 Soules and Takagi disclose the phosphor composition used in laser diode driven by pulse mode but are silent about the structure of the light emitting device comprising base, casing, cap coated with phosphor composition joined to the casing wall.

Lowery in same field of endeavor discloses (Fig. 2 column 4 lines 31-33, column 6 lines 6-10) the light emitting device comprising LED 22 disposed on base 30, a casing wall 32 joined to the base at a first end of the casing wall and a transparent cap 52 (fluorescent plate) coated with phosphor composition joined to the casing wall at the second end. Lowery further teaches this configuration of LED package producing white

light provides the advantage of pre-fabricated fluorescent planar member which can be included with light emitting diode and hence simpler method of fabrication.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the light emitting device comprising laser diode of Soules and Takagi having a base, a casing wall joined to the base at a first end of the casing wall and a transparent cap (fluorescent plate) coated with phosphor composition joined to the casing wall at the second end as suggested by Lowery for an LED package producing white light with the advantage of pre-fabricated fluorescent planar member and hence simpler method of fabrication.

Regarding claim 36 Lowery further discloses (column 6 lines 54-63) a lens 54 positioned adjacent to the transparent cap to direct light from the device.

Regarding claim 37, Lowery discloses the claimed invention except for the limitation of the lens being planar. It has been held that a change in shape is generally recognized as being within the level of ordinary skill in the art. It would have been obvious to one having ordinary skill in the art to include a planar lens instead of a dome lens in the device of Lowery, since such a modification would have involve a mere change in the shape of a component.

Regarding claim 38 Lowery discloses the lens being a dome lens.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,635,363 to Duclos et al. and further in view of U.S. Patent 6,490,309 to Okazaki et al.

Regarding claim 33 Duclos discloses (Fig. 2, 3 column 4 lines 15-40, column 5 lines 4-12) a light emitting device comprising a laser diode 42 (column 1 lines 17-20, GaN based structures include light emitting diodes and laser diodes), a phosphor composition 62 positioned to receive light from the diode the phosphor composition is capable of absorbing blue light from the diode and emitting light at a longer wavelength.

Duclos is silent about the light emitting device comprising a driver circuit operating the laser diode in a pulse or continuous wave mode.

Okazaki in same field of endeavor discloses (column 10 lines 19-30) a laser diode including a driving circuit so that the laser diode is operating in pulse mode. Okazaki teaches that this configuration enhances the efficiency of the wavelength conversion and thus increases the output.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include a driving circuit so that the laser diode of Duclos operates in a pulsed mode as suggested by Okazaki for enhancing the efficiency of wavelength conversion.

Allowable Subject Matter

Claim 32 is allowed over the prior art of record.

The following is an examiner's statement of reasons for allowance:

Regarding claim 32 the prior art of record neither teaches nor suggests the light emitting device with all the limitations as claimed and particularly the phosphor

composition consisting of a first type of phosphor consisting of ZnS: Mn^{2+} and a second type of particles.

Response to Arguments

Applicant's arguments with respect to claim 33 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPN 5,208,462 to O'Connor et al. and USPN 6,653,765 to Levinson disclose phosphors converting light emitted from uv/blue light emitting diodes or laser diodes.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sikha Roy

Sikha Roy
Primary Examiner
Art Unit 2879